



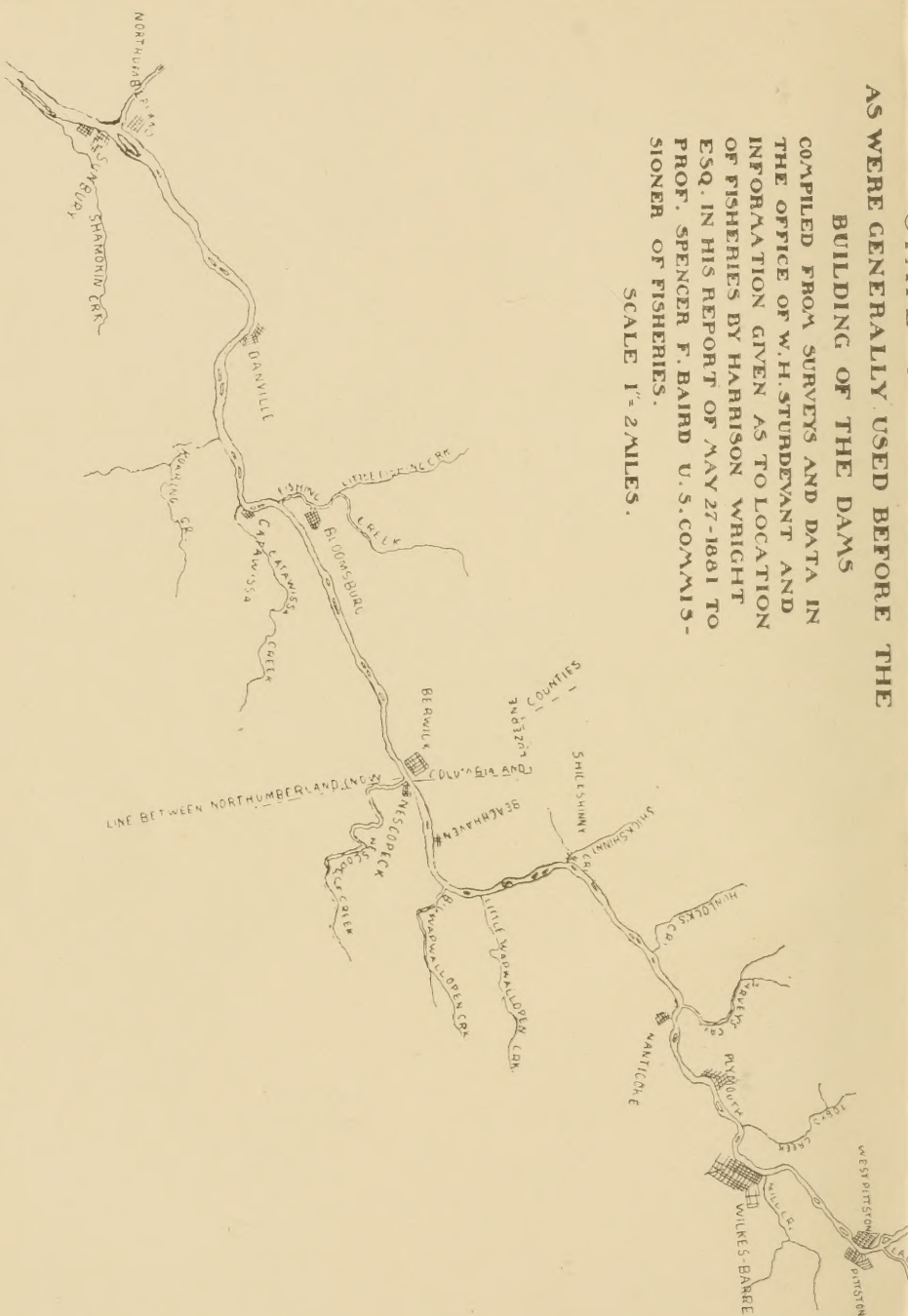
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Division of Fishes
U. S. National Museum

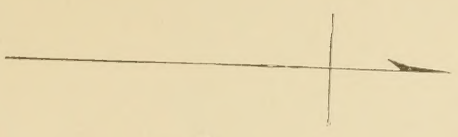
AS WERE GENERALLY USED BEFORE THE BUILDING OF THE DAMS

COMPILED FROM SURVEYS AND DATA IN
THE OFFICE OF W.H. STURDEVANT AND
INFORMATION GIVEN AS TO LOCATION
OF FISHERIES BY HARRISON WRIGHT
ESQ. IN HIS REPORT OF MAY 27-1881 TO
PROF. SPENCER F. BAIRD U.S.CO.MIS-
SIONER OF FISHERIES.

SCALE 1"=2 MILES.



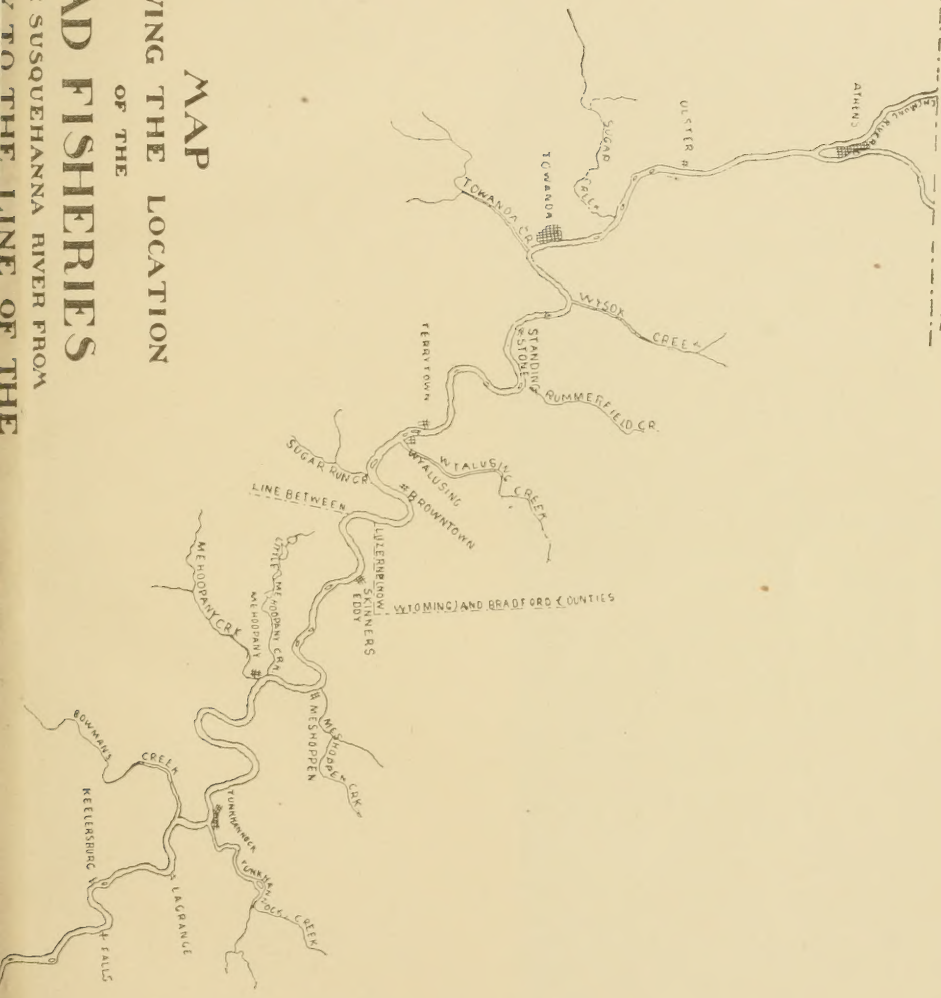
STATE OF NEW YORK



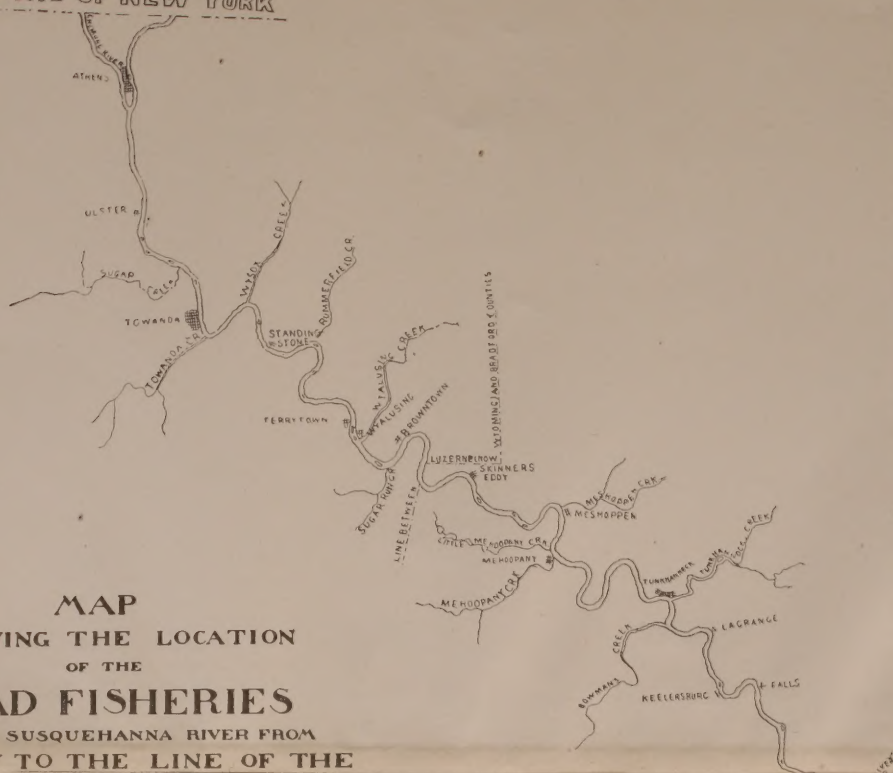
MAP SHOWING THE LOCATION OF THE

SHAD FISHERIES

ON THE SUSQUEHANNA RIVER FROM
STURRY TO THE LINE OF THE



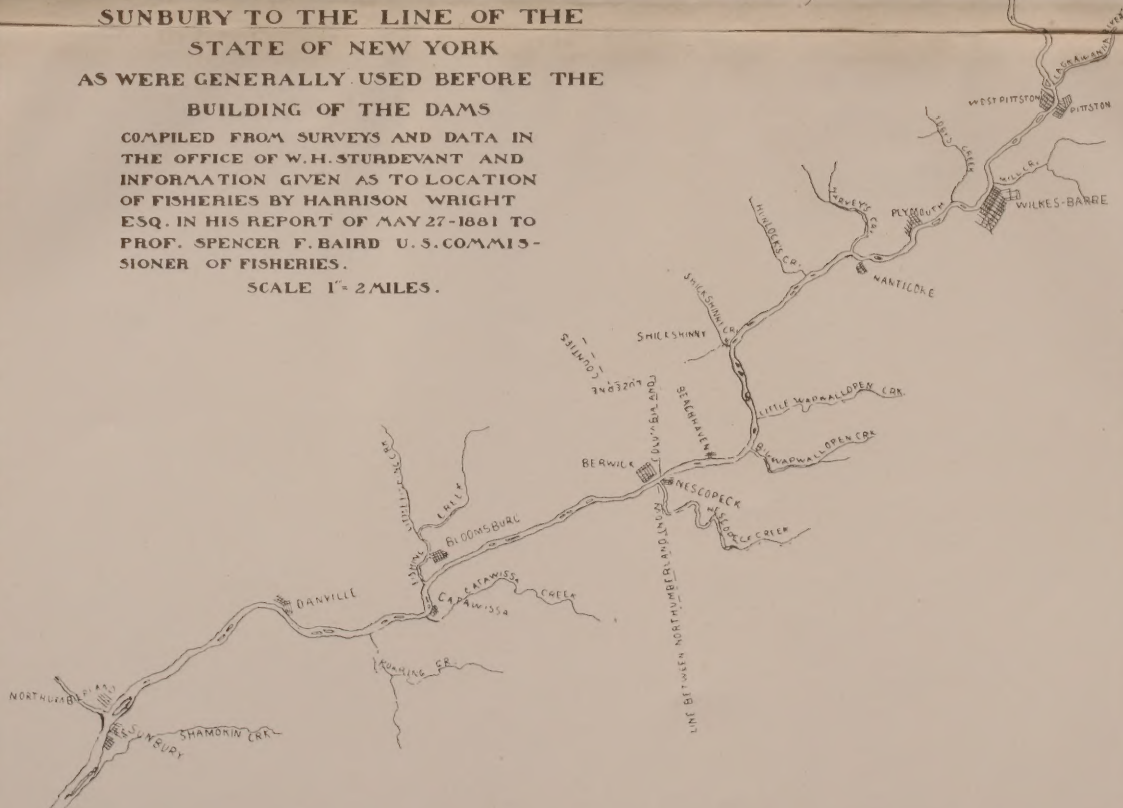
STATE OF NEW YORK



MAP SHOWING THE LOCATION OF THE SHAD FISHERIES ON THE SUSQUEHANNA RIVER FROM SUNBURY TO THE LINE OF THE STATE OF NEW YORK AS WERE GENERALLY USED BEFORE THE BUILDING OF THE DAMS

COMPILED FROM SURVEYS AND DATA IN
THE OFFICE OF W. H. STURDEVANT AND
INFORMATION GIVEN AS TO LOCATION
OF FISHERIES BY HARRISON WRIGHT
ESQ. IN HIS REPORT OF MAY 27-1881 TO
PROF. SPENCER F. BAIRD U. S. COMMISSIONER OF FISHERIES.

SCALE 1" = 2 MILES.



THE SHAD STREAMS OF PENNSYLVANIA.

BY JOHN GAY.

Although the area of Pennsylvania is large and her streams numerous, there are only two outlets for the water which falls upon her eastern surface. The water shed really commences out of the state, and, after following a long and tortuous line through her territory, ends beyond the limits of the commonwealth. Of the two great water courses of the eastern slope the Susquehanna river, with its large and important branches, famous in song and story, is well worthy of taking front rank among the finest natural shad streams in the country. The extent of this river, including its tributaries, can be best understood by the following distances: From the New York state line on the North Branch to the mouth of the river the distance is about two hundred and sixty miles. From the mouth of Bennett's branch of the Sinnemahoning to Northumberland is something over one hundred miles. From Clearfield to the mouth of the Sinnemahoning is about thirty-five miles. From Hollidaysburg to the mouth of the Juniata is about one hundred miles, and from Bedford to the Raystown branch of the Juniata the distance is over sixty miles. Estimating the tributaries (the Swatara, the Codorous and the Conodoguinet) at eighty miles, and we have a distance by the thread of the streams of six hundred and thirty-five miles.

Ever since the appearance of the white man on its banks the Susquehanna has been noted for the quality of the shad (the most important of the food fishes indigenous to Pennsylvania) taken from it, and within the memory of many persons now living the river is celebrated for the quantity of this delicious fish, taken fifty or sixty years ago when the catches at the different fisheries for several hundred miles along this stream were sufficiently large not only to supply the immediate wants of the inhabitants of the counties bordering on the river, but enough also for salting down a year's supply, not to speak of the number taken a distance to exchange for salt and other necessities of life.

It is interesting to learn from collections made by the Wyoming Historical and Geological Society that beyond a doubt the Indians, for years before the white people thought of settling on the upper stretches of the Susquehanna, caught shad there in large quantities. An occasional stone net-sinker can yet be found on the flats along the river, and it is said that the fragments of Indian pottery unearthed show unmistakable markings with the vertebrae of the shad. Some of the early settlers are

also said to have seen the Indians catching shad in seines made of bushes.

The energetic and thrifty Connecticut people who settled in the beautiful Wyoming valley were thoughtful enough to bring twine seines with them, and no doubt were the first white people to seine the North Branch for shad. They were a hardy class of pioneers, ready to battle for their rights, and during the thirty years' war with the the Pennsylvania government for the possession of the Valley of Wyoming, depended largely on the shad supply as a means of subsistence, and one of the most bitter complaints made against the "Pennamites" in 1784 was that they had *destroyed the seines*.

After the troubles between the Pennsylvania claimants had been settled or quieted the shad fisheries increased in numbers and value yearly until about the year 1830, when the internal improvements commenced by the state in 1826 were finished. The people simply concluded that the fisheries were destroyed and thenceforth took little or no interest in the matter, leaving the streams subject to depredations of all sorts. Unfair fishing of every kind was resorted to and the streams became almost entirely depleted. The gradual disappearance of fish was overlooked in the general enthusiasm of the people on the subject of cheap and rapid transportation facilities. The commonwealth could not afford to neglect the vast mineral resources of the interior and to prohibit manufacturing in order that the fish might have unrestricted admission to their spawning beds at all seasons, and the result was that in order to feed the canals of the state a series of dams were erected in the Susquehanna river, each of which at once became an insurmountable obstruction to the fish ascending from the sea to their best and natural spawning beds far up the headwaters of that stream.

In 1881 the Wyoming Historical and Geological Society, in response to inquiries made by the late Prof. Spencer F. Baird, United States Commissioner of Fish and Fisheries, touching the old shad fisheries on the North Branch of the Susquehanna, referred the matter for investigation to a committee, of which Harrison Wright, Esq., was chairman.

The report submitted by Mr. Wright shows that much labor and care were involved in procuring reliable data, and the information furnished is of much interest even to the general reader. Accompanying the report was a map of the Susquehanna river, from the junction of the West Branch at Northumberland to Towanda, near the New York state line. Upon this map was noted the localities of the fisheries with as much accuracy as was attainable from the accounts received. It was thought probable some of the fisheries were omitted, especially in the stretch of river from Danville to a point four miles above Bloomsburg. A tracing of the map referred to forms a portion of this report.

The information contained in the few pages following is in the main obtained from Mr. Wright's valuable report.

At Northumberland, or just below, was Hummel's fishery; between Northumberland and Danville there were eight fisheries in order from Northumberland up, as follows: (1) Line's Island lower fishery; (2) Line's Island middle fishery; (3) Smith's fishery; (4) Line's Island upper fishery; (5) Scott's fishery; (6) Grant's fishery; (7) Carr's Island fishery; (8) Rockafeller's.

The next fishery of which we have record was the fishery of Samuel Webb, located about four miles above Bloomsburg. Above this point about four miles, and six miles below Berwick, was the fishery of Benjamin Boon; the next was located just above the town of Berwick, and about a mile and a half above Berwick was the Tuckahoe fishery (this last is the same as the Nescopeek fishery mentioned in Pearce's history); the next was at Beach Haven. Between the latter place and Nanticoke dam there were three, viz: One at Shickshinny; one just below the mouth of Hummel's creek, and one called the "Dutch" fishery on Croup's farm.

Above Nanticoke there was one belonging to James Stewart, about opposite Jamison Harvey's place; one at Fish Island; and one at Steele's Ferry, called the Mud fishery. The next was on Fish's Island, three-quarters of a mile below the Wilkes-Barre bridge; the next was Bowman's fishery, a little above the bridge; the next was the Monacacy Island fishery; the next Casey's; the next was on Wintermoot Island, this last landing on the left bank above the ferry at Beauchard's; the next was at Scovel's Island, opposite Lackawanna creek; this and the Falling Spring fishery next above belonged to parties living in Providence, away up the Lackawanna. The next above was Harding's in Exeter township; the next above was at Keeler's in Wyoming county; the next was at Taylor's (or Three Brothers) Island, this latter fishery was no doubt the one referred to by P. M. Osterhout as being opposite McKune's station on the Lehigh Valley railroad; the next was at Hunt's Ferry five miles above Tunkhannock; the next was at Grist's Bar, about a mile above Meshoppen; the next was at Whitecomb's Island, a mile below Black Walnut Bottom; a half mile above this fishery was the Sterling Island fishery, and the next above was Black Walnut, and half a mile further up was the Chapin Island fishery; the next was at the bend at Skinner's Eddy; the next was at Browntown, in Bradford county; the next was at Ingham's Island; the next was at the mouth of Wyalusing creek; two miles further up was one at Terrytown; the next and last that there is any record of was at Standing Stone, about six miles below Towanda. Thus it will be seen that between Northumberland and Towanda there were about forty permanent fisheries.

Speaking of the money value of the fisheries, Mr. Wright says:

"Our county records only go back to 1787. We spent a whole day in searching the first volumes, in hopes that we might find some entries of transfers of fishing rights, but our search was fruitless; we have, however, found among the papers of Caleb Wright a bill of sale of a half interest in a fishery between Shickshinny and Nanticoke, called the

'Dutch fishery;' the price paid was £20, 'lawful money of Pennsylvania,' equivalent to \$53.33."

It is a matter of record that Caleb Wright's son received as his share of one night's fishing at this fishery 1,900 shad. Jonathan Hunlock's interest in the Hunlock fishery was worth from \$500 to \$600 per annum; it was a half interest. A Mr. Fassett was one of eleven owners in the Sterling Island fishery and his interest was valued at \$100.

Mr. Hollenback's information on the money value of fisheries is considered by far the most valuable; he says the Standing Stone fishery was worth about \$300 to \$400 [per annum; the Terrytown fishery was worth about the same; the Wyalusing Creek fishery was worth about \$250 per annum; the Ingham Island fishery \$50 less; the Browntown and Skinner's Eddy fisheries about \$150 per annum each. "The Widow Stewart, at the Stewart fishery, used often to take from \$30 to \$40 of a night for her share of the haul."

The data bearing upon the commercial value only gives to the forty fisheries an annual value of about \$12,000, a very considerable amount for those days, yet evidently it can be looked upon as too small, and the "catch" should be considered in forming a basis of calculation.

At the eight fisheries near Northumberland large numbers of shad were taken; three hundred was a common haul; some hauls ran from three to five thousand. The Rockafeller fishery just below Danville (about the year 1820) gave an annual yield of from three to four thousand, worth from twelve and a half cents to twenty-five cents a piece.

The fishery above Berwick was one of the most productive, and in speaking of it, Mr. Fowler says that he assisted there in catching "thousands upon thousands," but does not give the average annual yield; he also says that at the Tuckahoe fishery "many thousands were caught night and day in early spring," and at the Webb and Boon fisheries the hauls were immense; at the latter they got so many at a haul that they couldn't dispose of them, and they were actually hauled on Boon's farm for manure.

At Hunlock's fishery the annual catch must have been above ten thousand. At the Dutch fishery in one night thirty-eight hundred were taken. At the Fish Island fishery, at a single haul, nearly ten thousand shad were taken.

Just before the dam was put in, Mr. Jenkins recollects of seeing a haul at Monocacy Island of twenty-eight hundred. At Scovil's Island the catch was from twenty to sixty per night; at Falling Spring fifty to three hundred per night; at Taylor's Island from two hundred to four hundred per night. At Wyalusing the annual catch was between two and three thousand, and at Standing Stone between three and four thousand. The daily catch at Terrytown fishery was about one hundred and fifty. Major Fassett says that at the Sterling Island fishery "over two thousand were caught in one day in five hauls."

It is a plain deduction from the above facts that the fisheries down the river were much more valuable than those above. Above Monocacy we hear of no catch over two thousand, while below that point they were much larger, and while from \$300 to \$400 seems to be the general annual value above, we find the fishery at Hunlock's, twelve miles below, was worth from \$1,000 to \$1,200 per annum. The shad further up the river appear to have decreased in numbers yet to have increased in size.

The opinion seems to be general that the great size attained by the Susquehanna shad was attributed to the long run up the fresh water stream (carrying the idea of the survival of the fittest); that they were of great size is beyond doubt; nearly every one who recollects them insists on putting their weight at almost double that of the average Delaware shad of to-day. Mr. Van Kirk gives as the weight of the shad caught at the fisheries in Northumberland and Montour counties as from three to nine pounds.

Mr. Fowler says he has assisted in catching thousands weighing eight and nine pounds at the fisheries in Columbia county.

Mr. Harvey, speaking of the Luzerne county shad, says: "Some used to weigh eight or nine pounds, and I saw one weighed on a wagger which turned the scales at thirteen pounds."

Major Fassett, speaking of those caught in Wyoming county, says: "The average weight was eight pounds, the largest twelve pounds."

Dr. Horton says of the shad caught in Bradford county, that he has seen them weighing nine pounds: ordinarily the weight was from four to seven pounds.

The price of the shad varied, according to their size, from four pence to twenty-five cents, depending, of course, on their scarcity or abundance.

At a town meeting held at Wilkes-Barre April 21, 1778, prices were set on articles of sale *inter alia* as follows: Winter-fed beef, per pound, 7d.; tobacco, per pound, 9d.; eggs, per dozen, 8d.; shad, apiece, 6d. At one time they brought but 4d. apiece, and a bushel of salt would at any time bring a hundred shad.

At the time the dam was built they brought from ten to twelve cents. On the day of the big haul Mr. Harvey says they sold for a cent apiece (Mr. Dana says three coppers). Mr. Isaac S. Osterhout remembers a Mr. Walter Green who gave twenty barrels of shad for a good Durham cow.

Mr. Roberts says that in exchanging for maple sugar one good shad was worth a pound of sugar; when sold for cash shad were worth twelve and one-half cents apiece.

Dr. Horton says the shad, *according to size*, were worth from ten to twenty-five cents.

In calculating the value of the fisheries near Wyalusing Mr. Hollenback has put the value of the shad at ten cents apiece. In 1820 they were held in Wilkes-Barre at \$18.75 per hundred.

Every family along the river having some means had its half barrel, barrel or more of shad salted away each season, and some smoked shad hanging in their kitchen chimneys: but not only those living immediately along the river were the beneficiaries, as the testimony shows that the country folk came from fifty miles away to get their winter supply, camping along the river's bank and bringing in payment whatever they had of a marketable nature. They came from the New York state line, and from as far east as Easton, bringing maple sugar and salt, and from as far west as Milton, bringing cider, whisky, and the two mixed together as cider royal, and from down the river and away to the south towards Philadelphia, bringing leather, iron, etc. A dweller on the banks of the river would go to Salina, N. Y., taking shad, and his neighbor would accompany him with whetstones, which they traded for salt. The teams hauling grain to Easton brought back salt; in good seasons the supply of this latter important item always seems to have been short of the demand.

Miller & McCord, a firm doing business at Tunkhannock, dealt largely in shad, sending the cured ones up the river into New York State and far down the river.

The shad appear never to have gone up the West Branch in such quantities as they did up the North Branch, and the same may be said of the Delaware, or else the fish were of inferior quality, for the dwellers from the banks of both of these streams came to Wyoming for their supply of shad.

Mr. Wright and his committee entered upon the duties assigned them very evidently as a labor of love, and their investigation seems to have been as thorough as it was practical to make it. They interviewed, in person or by letter, a large number of the old settlers, those who still live or formerly lived near the banks of the river and were able to give the desired information. These persons in nearly every instance cheerfully and at no little trouble furnished the information asked. It was no little labor to them to write out their reminiscences of the early shad fisheries; necessarily they were far advanced in age, all with but one or two exceptions having reached their "three score years and ten." Besides these interviews the records of the county, files of old newspapers, and numerous printed local histories were consulted, and from these various sources much information was gleaned.

Joseph Van Kirk of Northumberland says:

"I take pleasure in saying that my recollection of the shad fisheries dates back to the year 1820. In that year and the succeeding two or three seasons I fished at Rockafeller's fishery near Danville. In our party there were six of us. We fished with a seine one hundred and fifty yards long, and caught something from three thousand to four thousand marketable shad, weighing from three to nine pounds. At that time there were eight fisheries between Danville and Line's island.

At all these fisheries large quantities of shad were caught, and they were sold from twelve and one-half cents to twenty-five cents apiece. I have heard of hauls containing from three thousand to five thousand, and three hundred was a very common haul. People came from twelve to fifteen miles for shad and paid cash exclusively for them.

"The cutting off of the shad supply was a great and serious loss to this community from both a monetary and economic view, since this fish in its season was a staple article of food, and employed in the taking and hauling quite a large proportion of the inhabitants. This industry was wholly abolished by the erection of dams, and thousands of dollars of capital invested in the business were instantly swept out of existence. All of the fisheries were profitable investments and the loss of them to this section of the country was incalculable."

Mr. Henry Roberts writes from Falls, Pa., as follows:

"The first fishery at the head of Scovel's island, opposite Lackawanna creek; not many shad were caught here—say from twenty to sixty per night. The next was at Falling Spring; same seine as that used at Scovel's island. The number of shad caught here ran from fifty to three hundred per night. The next above Falling Spring was at Keeler's ferry (now Smith's); this was a small fishery and was only used when the water was too high to fish at other points. The seine was hauled around a deep hole to bring in the shad. The next and only fishery between this and Tunkhannock creek was at the head of Taylor's island, or the 'Three Brothers.' This was an important fishery; more shad were caught here than could be taken care of on account of the scarcity of salt. I can speak of this fishery from experience since 1812. The catch per night ran from two to four hundred. The shareholders attended to it as closely as to their farming or other business, as it was our dependence in part for food. Shad was oftener exchanged for maple sugar than sold for cash—one good shad for a pound of sugar. Large shad were worth twelve and one-half cents apiece; a right in a fishery was worth from ten to twenty-five dollars; shareholders made a practice of salting down more or less shad during the season. An incident in connection with shad fishing presents itself to my mind, related often by my grandmother. A party of Indians returning from a treaty at Philadelphia landed their canoes, came to her house to borrow her big kettle to cook their dinner in; after building the fire and hanging over the kettle they put in the shad just as they were taken from the river, with beans, cabbage, potatoes and onions. My grandfather, David Morehouse, one of the early Connecticut settlers, then owned the same farm I occupy. I am now in my eighty-seventh year."

Mr. H. C. Wilson, residing at Mt. Vernon, Ohio, sent the following:

"I noticed in the *Union Leader* an article in reference to the old shad fisheries of the Susquehanna river, and it brought back to my memory many things that happened in my boyhood days, among which

were the old fishermen and the knitting of the old shad seines. The seines were knit in sections by the shareholders, each owning so many yards of the net, and each one receiving his share of fish according to the number of yards owned. I lived one year with Mr. Pierce Butler, where I learned to knit seines, and have never forgotten it. We used to knit on rainy and cold days and evenings, and when the sections were all done, Dick Covert, with the help of John Scott, would knit them together and hang the same, put on the corks and leads: this was considered quite a trick, and but few would undertake the job. I remember I used to go over on the beach on the line of the Butler and Dorrance farms and help the fishermen pick up the shad, and when the luck was good, always given one to take home. I remember seeing the shad put in piles on the beach, and after they were all equally divided some one would turn his back and the brailman would say, 'who shall have this?' until they all received their share, one pile left out for the poor women. The boats with the seine shipped would row up to the falls and then hauled out down by the riffles opposite where Dick Covert used to live. I think it was a bad day for the people along the Susquehanna when the shad were prevented coming up the river; the fish would be worth more to the people than the old canal. You had better buy the canal, put a railroad on the tow-path, burst up the dams and increase the value of all the flats above the dams, then you would have plenty of shad and all other kinds of fish, and then I think you could afford to send some to your friends out west. I got an old fish-dealer here to send to Baltimore for some shad, but they had been too long out of water and too far from home to be good. It used always to be said that there were no shad like the Susquehanna shad."

Writing from Kansas City, under date of March 22, 1881, Mr. Alvan Dana says:

"I have no remembrance of any shad being taken at or near Sheshenquin, but at Wilkes-Barre I have seen shad caught in seines before any bridge was built there. The nets were drawn at the north side of the river; I don't remember to what extent was the catch, but I have often heard my grandmother say that immense quantities were taken in the vicinity of her father's, who lived about a mile below the old 'Red Tavern' in Hanover; that at one haul 9,999 were caught; that when they had got all they could procure salt to cure or sell for three coppers, they gave to the widows and the poor, and hung up their nets, though the shad were as plenty as ever. In 1816, I went to Owego to live, and there became acquainted with a Mr. Duane, who was one of the men who drew the net: he said the actual number was 9,997, but two more were added to make the figures all nines.

"When the Nanticoke dam was built, the shad could not come above it, and men were in the habit of fishing there with a three-pronged hook, sinker and stout line and pole; this was sunk, and after a few minutes

quickly jerked up; I caught two in that way; others had better luck, and it was reported that one man caught seventy in one day; but I think a large reduction would come nearer the truth."

Mr. C. Dorrance sends from Hot Springs, Arkansas, the following report:

"I must from necessity confine myself to the shad fisheries within Wyoming Valley. My memory carries me back to the fishery at Monocacy island, the one below the falls near the mouth of Mill creek, one at Plymouth (in part a night fishery), one at or immediately below Nanticoke falls.

"The fishery near Mill creek was regarded as the main or most reliable fishery, as it could be fished at stages of water when some of the others could not, and much the largest number of shad were taken there, sweeping as it did from the foot of the falls, nearly the entire river to the bar—drawing out upon the lands of my father, where it was my business, as a lad, every evening after school, to be with horse and wagon to receive our share of shad. No unpleasant duty, for well do I remember as they came sweeping into the beak, the net in rainbow form; the corks indicating the position where Captain Bennett would discharge his men from the sea, or large boat with the outer brail, and passing out and along the net, on the discovery would shout, 'Here's shad boys, hold down the lead line!'

"As to the money values or rentals, I have no data from which to form an opinion, as the fisheries were established by the first settlers joining their limited means with the land owners, forming a company there by common consent to their children; none were rented as far as my knowledge extends. Owners of rights would allow men who had none to fish for them on shares, thus extending the benefits as far as possible; good feeling pervaded the community in those days.

"With the exception of an occasional striped bass, or, as they were then called "Oswego bass" of large size (supposed to have been introduced to the head waters of the Susquehanna from that lake), none of value were taken, as the nets were woven for large shad only."

"I cannot better illustrate the value and importance of the shad fisheries at that early day, to the people on the Susquehanna river, than to repeat an anecdote told me long years after by a genial gentleman of New England, who, in youth, visited my father at his home in Wyoming. Leaning on the front gate after breakfast, as the little children were passing to school, each with a little basket, the universal answer from their cheery upturned faces was, 'Bread and shad, Bread and shad (corn bread at that).

"What think you, my dear sir? Had that fish diet anything to do with the known enterprise of that generation? If so, would it not be well to make a strong and united effort to again introduce so valuable an element of brain material?

"I am greatly pleased that our society is agitating the subject of restoring the shad to the people of the North Branch, not as a luxury for the few, but for all, cheap and faithful and coming at a season of the year when most desirable for food, for nowhere on this continent were finer shad found than those taken from the North Branch of the Susquehanna river.

"The long run of the pure, cold, spring-made waters of the Susquehanna made them large, hard and fat, nowhere equaled

"Why must we be denied this luxury when other streams are being filled with fish?"

The following extracts are taken from a history of early shad fishing in the Susquehanna, written by Hon. P. M. Osterhout:

"The first shad caught in the Susquehanna river was by the early settlers of the Wyoming valley, who emigrated thither from Connecticut. The food of the early emigrants was, in the main, the fish in the streams and the game on the mountains. The first seine in the valley was brought from Connecticut, and upon the first trial, in the spring of the year, the river was found to be full of shad. These emigrants had settlements along the Susquehanna from Wyoming to Tioga Point, now called Athens; and each neighborhood would establish a fishery for their own accommodation. It was generally done in this way: Say about ten men (and it took about that number to man a seine) would form themselves into a company for the purpose of a shad fishery. They raised the flax, their wives would spin and make the twine and the men would knit the seine. The river being on an average forty rods wide the seine would be from sixty to eighty rods long. The shad congregated mostly on shoals or the point of some island for spawning and there the fisheries were generally established. Shad fishing was mostly done in the night, commencing soon after dark and continuing until daylight in the morning, when the shad caught would be made into as many piles as there were rights in the seine. One of their number would then turn his back and another would touch them off, saying, pointing to a pile, who shall have this and who shall have that, and so on until all were disposed of, when the happy fishermen would go to their homes well laden with the spoils of the night. Between the times of drawing the net, which would be generally about an hour, the time was spent in the recitation of fish stories, hair-breadth escapes from the beasts of the forests, the wily Indian, or the Yankee production, the ghosts and witches of New England.

"As early as 1800 George Miller and John McCord moved from Coxestown—a small town on the Susquehanna, about five miles above Harrisburg—up the river in a Durham boat, and bringing with them a stock of goods located at Tunkhannock, where they opened a store. They were both young men and unmarried. In the spring of the year they dealt quite largely in shad, the different fisheries in the neighborhood

furnishing them with large quantities for curing and barreling. Shad were plenty but salt scarce. There was no salt except what was wagoned from the cities or from the saltworks at Onandaga, New York, and it was not unusual that a bushel of salt would purchase one hundred shad, in fact it was difficult to procure salt to cure them. At this time the German population in the lower counties of the state had not learned the art of taking shad by means of the seine.

"There were no dams or other obstructions to the ascent of the fish up the river, and large quantities of the finest shad in the world annually ascended the Susquehanna, many of them when taken weighing from six to eight pounds each. The distance being so long (about two hundred miles) from tide water to the Wyoming valley the flavor of the shad was very much improved by contact with fresh water.

"The Susquehanna shad were superior to the Delaware, the Potomac, the Connecticut or the North river shad. The reason generally given was their being so long in fresh water, which imparted to the fish a freshness and richness not found in the shad of other rivers. Then none but the strong healthy shad could stem the current and reach the upper water of our beautiful river. Miller and McCord cured and put up annually shad for the market. They boated down the river a large quantity for the times, and sold to the people on the lower Susquehanna. They also boated shad up the river as far as Newtown, now Elmira, from thence they were carted to the head of Seneca lake, a distance of twenty miles, and from there were taken to Geneva and other towns, in what was then called the Lake country, and sold.

"There was a fishery on the upper point of the island opposite McKee's station on the Lehigh Valley railroad. This island was known by the early settlers as one of the Three Brothers. There was also an important fishery at Hunt's Ferry, about five miles above Tunkhannock. Here large quantities of shad were caught every spring. This fishery was owned by twenty rights, ten fishing at alternate nights. There was also another fishery at Black Walnut, below Skinner's Eddy. At all these fisheries more or less Oswego bass were caught, called down the river Susquehanna salmon, a most excellent fish, but they are now nearly extinct. The river ought to be restocked with that same species: they are a fine-flavored fish, solid in meat, and grow to twelve or fifteen pounds in weight. The late George M. Hollanback, Esq., of Wilkes-Barre, told me that this bass was brought from the Oswego lake and put into the Susquehanna at Newtown, now Elmira. They were called by the old settlers swager bass. Since the building of dams across the Susquehanna there have been no shad caught above the Nanticoke dam. These dams also largely obstruct the passage of bass and other food fish up the river.

"The Susquehanna is really one of the finest streams for fish in the United States—the water pure, the bottom rocky and pebbly, affording

abundant means for spawning and rearing the young fish. The obstruction to the free passage of fish up the river ought to be removed."

On February 23, 1881, Mr. Gilbert Fowler, of Berwick, Pa., writes what he knows about shad fishing in the Susquehanna:

"I write or dictate this letter on my eighty-ninth birthday. I have lived near the Susquehanna river ever since I was born. My knowledge and recollections about the shad fisheries extend from Wilkes-Barre to old Northumberland. The first shad fishery near my home was Jacob's Plains. This was located just above the town of Berwick, and one of the most productive fisheries on the river. Here I have assisted in catching thousands upon thousands of the very finest shad, weighing eight and nine pounds.

"The next nearest was Tuckahoe fishery, situated about one and a half miles above Berwick, on the same side of the river. At this place many thousands were caught night and day in early spring. The next was down the river about six miles from Berwick. This was the fishery of Benjamin Boon. At this fishery I have known so many caught that they were actually hauled out by the wagon load on Benny Boon's farm for manure, so plenty were they.

"The next fishery was that of Samuel Webb, located about four miles this side of Bloomsburg. This was an immense shad fishery. From the banks of the river at this fishery could be seen great schools of shad coming up the river when they were a quarter of a mile distant. They came in such immense numbers and so compact as to cause or produce a wave or rising of the water in the middle of the river extending from shore to shore. These schools, containing millions, commenced coming up the river about the first of April and continued during the months of April and May. There was something very peculiar and singular in their coming.

"The first run or the first great schools that made their appearance in the early spring were the male shad—no female ever accompanied them. In about eight or nine days after the male had ascended the river, then followed the female in schools, heavily laden with eggs or roe. Those were much the largest and finest fish, and commanded the highest price. Those shad that were successful in eluding the seine and reached the hatching ground at the head waters of the Susquehanna, after depositing their eggs, returned again in June and July, almost in a dying condition, so very poor were they, many died and were found along the river shore. The young shad would remain at their hatching place till late in the fall, when they would follow the old shad to the salt water: during the summer they would grow from three to four inches long.

"The Susquehanna shad constituted the principal food for all the inhabitants. No farmer, a man with a family, was without his barrel of shad the whole year round. Besides furnishing food for the immediate

inhabitants, people from Mahantongo, Blue mountains, and in fact, for fifty miles around, would bring salt in tight barrels and trade it for shad. They would clean and sort the shad on the river shore, put them in barrels and return home. The common price of shad was three and four cents each.

"Besides shad, there were many other kinds of food-fish. The most noted among them was the old Susquehanna salmon, weighing as high as fifteen pounds. These salmon were considered even superior to the shad and commanded a higher price. They were caught in seines, on hooks and lines, and were the sport to the gigger at night. Nescopeck falls, directly opposite Berwick, near where the Nescopeck creek empties into the river, was a noted place for salmon fishing with hook and line. Men standing on the shore with long poles and lines often, in drawing out the fish, would lodge them in the branches of the trees, giving them the appearance of salmon-producing trees. The shad fisheries, which I have alluded to, were not common property. The owner of the soil was the owner of the fishery, and no one was allowed to fish without a permit. The owners of the fishery also had the seines, and when not using them they would hire them out to others and take their pay in shad; the seiner's share was always one-half the catch. At the Webb fishery I have known eleven and twelve thousand shad taken at one haul. Those fisheries were always considered and used as a source of great pleasure, value and profit, and everybody depended on them for their annual fish and table supply. It was considered the best and cheapest food for all.

"Immediately after the erection of the river dams the shad became scarce, the seines rotted, the people murmured, their avocation was gone and many old fishermen cursed old Nathan Beach for holding the plow, and the driver of the six yokes of oxen that broke the ground at Berwick for the Pennsylvania canal. The people suffered more damage in their common food supply than the state profited by her 'internal improvement,' as it was called. Although eighty-nine years old to-day, I still hope to live long enough to see all the obstructions removed from one end of the noble Susquehanna to the other, and that the old stream may yet furnish cheap food to two millions of people along its banks, and that I may stand again on the shore of the old Webb fishery and witness another haul of ten thousand shad."

George F. Horton contributes the following statement:

"I spent many a pleasant day in my boyhood with the men who ran the shad fishery in the Susquehanna near where I now live. I could easily fill a small volume with a description of the varied amusements and merriments of those by-gone days; but that would hardly be what you are after. This fishery was about two miles above the mouth of the Wyalusing creek at the place we now call Tarrytown; formerly all was Wyalusing along here. There were other fisheries above and below us, but this the only one I have any personal knowledge of. The proprie-

tors were Jonathan Teny, Esq., Major John Horton, Sr., Major Justus Gaylord, Gilbert Merritt, William Crawford and William Wigton. Year after year, for a long time, these men operated this fishery, generally taking the month of May and a part of June of each year, always regaling themselves with a little good *old rye*, and having a fine sociable every night when counting off and distributing the shad caught during the day. Occasionally they sent substitutes, but the fishery never changed proprietors. Some seasons they caught largely; others not so many. I well recollect one draught or haul, when they caught five hundred; but ordinarily twenty to fifty at one drawing of the seine was considered good. The average per day, according to the best of my recollection, would be about one hundred and fifty."

"People came from the eastern part of the country, then just settling, up to Wyalusing, as far or nearly as far as from Montrose, to buy shad. The trade was quite large; some of the time maple sugar was quite a commodity brought down to exchange for shad.

"Very few of any other kind of fish except shad were ever caught. Occasionally a striped bass, large pickerel, carp, sunfish, mullet, sucker or a bullhead was taken; no small fish, as the meshes of the seine were large enough to let them through.

"The shad were worth from ten to twenty-five cents each, according to size. I have seen them caught here weighing nine pounds; ordinarily their weight was from four to seven pounds. If we could have that old shad trade here again it would make us all, if not rich, merry again. But very few are now left among us who saw those glorious old fishing days. The fishing for black bass of these days does not begin with those old fishing days.

"I can recollect of but one fishery between Wyalusing and Towanda, and only two between Wyalusing and Tunkhannock."

The following interesting statement comes from Mr. S. Jenkins.

"The present inhabitants of Wyoming have but a faint idea of the value of fish to the early settlers. They performed as important a part at Wyoming as they have in the history of all new settlements. A careful study of the advance of immigration and the settlement of new regions shows that those settlements have been guided and controlled by the streams and waters in which fish abounded, and hence were made along their shores. Fish furnished the people a plentiful and healthful supply of food, easily attainable, until the forests could be hewn down, clearings made, crops raised, cattle could increase and multiply.

"It is unquestionable that the early progress made in settling up of our country was due in a large measure to the presence of fish, which furnished food in absolute abundance in the midst of desert lands; and it would be idle to attempt to disparage the value in the economy of those times as it would be to prove the value now beyond the mere mention of the fact.

"The fish that attracted the most attention and were the most highly considered in the early times were shad. The knowledge of these excellent fish in the Susquehanna at Wyoming has become almost entirely historical, if not entirely so. But few persons now resident at Wyoming have a personal knowledge of the shad fisheries there and their value to the people in the early days, and hence some of the stories told of the immense hauls made in 'ye olden time' seem to the present generation more fabulous than real.

"That we may better understand the subject I will give extracts from the writings of strangers and then conclude with an account of two of our own people and what I myself have seen. In 1779, when General Sullivan passed through Wyoming on his western expedition against the Indians, a portion of his advance were located at Wyoming from May to the last of July. Many of his officers kept diaries, in which they noted their movements from day to day and touched slightly upon such objects of interest as attracted their attention. I will give a few extracts from these diaries relating to fish at Wyoming:

"Dr. Crawford, in his diary, under date of June 14, 1779, says:

"'The river at Wyoming abounds with various kinds of fish. In the spring it is full of the finest shad. Trout and pickerel are also plenty here.'

"George Grant, under date of June 23, says:

"'The Susquehanna river affords abundance of fish of various kinds and excellent.'

"Dr. George Elmer, under date of 23d June, says:

"'Spent chief part of the day in fishing. Salmon, trout, suckers, bass and common trout are plenty in the river, of which we caught a number with a seine.'

"Daniel Gookin, under date of June 23, says:

"'The river Susquehanna on which this lies, abounds with fish; shad in great plenty in the spring, as they go up to spawn. The shores are covered with these fish which have died up the river through their too long stay in fresh water.'

"There were some twenty five or thirty what we called shad fisheries within the bounds of old Wyoming. Every available point for casting out and hauling in a seine on the beach, whether on an island or on the mainland, was used as a fishery and had its owners and its seine. The average number of shad taken at each of these fisheries in a season was from 10,000 to 20,000, beside other fish which were caught before and after the shad made their navigation. It is given on good authority that 10,000 were caught at one haul at the Stewart fishery, about midway between Wilkes-Barre and Plymouth, about 1790. This was called the widow's haul.

"The settlement, after the massacre of July 30, 1778, had so many widows and fatherless children among them that they made special

provisions of bounty for them on many occasions, which were wrought out in such a way as neither to give offense nor to convey a sense of undue obligation.

"Among the arrangements of this character was that of giving one of the hauls at each fishery, every year, to the widows and fatherless of the neighborhood, and hence called the 'widow's haul.' By common consent it was agreed that the widows should have a haul made on the first Sunday after the season of shad fishing commenced, and they were to have all caught, whether more or less.

"At the rate I have given, which is made up more from general information upon the subject than from statistics, the number of fish caught annually was about a half a million, which, at thirty cents each, would make \$150,000. Were the Susquehanna as well stocked with shad to-day as it was a hundred years ago, our keen and hungry fishermen would easily double the catch, and still, like *Oliver Twist*, 'cry for more.'

"I recollect seeing, in the spring of 1826, a haul made in a cove at the lower end of Wintermoot island, west side, numbering 2,800 shad. When thrown out they whitened a large space upon the shore. Being the first haul of the season, the fish were largely distributed among the people, and even after that my grandfather had a half barrel for his right as owner of the seine and fishery.

"About 1831 or 1832, in the fall, an unusual catch of eels was made in a wier on the east side of Wintermoot island. During one day and night 2,700 of them were caught, while many escaped from want of means to handle them and take them away as fast as they came in. Another day and night 900 of them were caught, when the basket floated off with the high water.

"I herewith give you copies of two papers in my possession bearing upon the shad fishery question. It will be seen by one of them that the price of shad in the early times was four pence, or four and one-third cents, each; quite a different price from what they sell at in our day. Tear the dam from the Susquehanna and we shall have plenty of shad if not at fourpence each.

"Be it known that I, Peter Shafer, have sold all my right in and unto all my right in the Dutch fishery, so called, below the Nanticoke falls, so called. For and in consideration thereof, I, Jacob Cooley do promise to deliver seventy shad unto William Miller, on account of me, the said Peter, on or before the 20th May, instant, or otherwise settle with said Miller for what I am indebted for my part of said seine, and likewise the said Cooley is to deliver six gallons of whiskey unto the said Peter between this date and Weat harvest.

"Witness our hands this 14th day of May, 1800.

"PETER SHAFER,

"JACOB COOLEY."

“James Fox holds an order for 725 shad drawn by George Frazer on James Stewart, date April 27.

“(Indorsed on the back in these words): ‘Credit for 350 shad received by me. David Morgan.

“(Indorsed): ‘Copy of Frazer’s order. Henry Thomas charges the estate with 4s. 8d. paid in rye. Paid.

“No. 40.

725
Rec’d 350

375 shad at 4d.

125s.

£6 5s., \$16 67

Interest on same, 9 50

\$26 17 (£=\$2.67)’”

Under date of March 22, 1881, Mr. Elisha Blackman writes as follows:

“I see by your correspondent’s (G. Fowler, of Berwick) published letter that he tells a *big fish story*. I incline to think, however, that it is true. I recollect when I lived with my grandfather, in what is now South Wilkes-Barre, perhaps 1798 or 1799 of last century, the great haul of shad at Nanticoke was made. I believe there were nine or ten thousand taken. A number of seines were engaged in it, and lawsuits were the consequence. Salt was scarce and dear. Northampton men came with pack-horses loaded with salt and returned loaded with shad. I bought and kept the public house that had been kept by John Court-right on the Plains, Wilkes-Barre township, in the spring of 1815. There were two fisheries between us and the Pittston ferry—one at Monocacy Island landing, on the shore of Mr. Samuel Cary’s land, the other at or near the Wintermoot island, and landing above the ferry at Blanchard’s. That season I got my supply at the upper fishery; the first day’s attendance was a ‘blank’ day—few or no fish. The large schools of Mr. Fowler’s times were dwindled greatly, caused undoubtedly by the numerous fisheries that existed below and the destruction of the young shad by the many eel-weirs in their descent to the ocean in the fall. My time was too valuable to attend on blank days. I left money with Mr. Joseph Armstrong and he sent me my supply when successful. The next season (1816) the difficulty that existed between the fishermen at Monocacy (twelve in number) and Mr. Cary, the owner of the land, by giving him the thirteenth share, settled the difficulty, and ever after I got my supply from the fishery until the canal dams cut off our supply totally. It was serious damage and inconvenience to us, as markets for fish and meat did not exist then as now. The Susquehanna shad had a far more delicious flavor than any we get now.

“General Isaac Bowman, Samuel Moffitt and some of our Plains neigh-

bors, having secured a landing on the Nommock at the foot of Monocacy island, fitted up a fine seine and necessary boats (canoes) and caught half a dozen shad, having fished twice as many days. I shared two, having found the whisky (before my temperance days); others outbid me, determined to taste the good of their labors. I fatigue much in writing, being in my ninetieth year."

Isaac Thompson writes from Lee, Lee county, Illinois:

"I was born in Pittston in 1796. My father's farm lay alongside of the Susquehanna river. I lived on the farm fifty-one years. In regard to the shad fishing, as I grew up to manhood I fished many days in the shad fishing season of the different years. The first run was the male shad—not near as good as the female. After catching the first run then, if we could have a rise of water then came the female—a far better quality. The female put for the headwaters of the river, and there would spawn; then the old fish would come back down the river, and the wind would often drive them ashore, and they would lay there rotting till they stunk. People used to come down from toward Easton, Northampton county, and bring whisky and salt, and trade for fish; also from the upper part of old Luzerne county, bringing maple sugar to trade for shad. One man by the name of Taylor bought fifteen and put them in a sack after they were cleaned, shouldered them and walked off with them. I have known upwards of a thousand caught in one day on the point of the island.

"As to the localities of the fisheries, there was one at Falling Spring, about four miles from where I lived, another on the point of Wintermoot island, and the next on the side of the island between two and three miles from where I lived. They drew out on the beach of Samuel Cary's farm; another just below that I think drew out on the farm of Crandall Wilcox; another just below the falls. We have done no fishing since the Nanticoke dam was built."

Steuben Butler, a son of Col. Zebulon Butler, who led the patriots at the battle and massacre of Wyoming, 1778, says:

"I was born in 1789; remember the old shad fisheries in the river here very well; was not a fisherman myself; after the run of shad had started I used to get in a boat and row up to the fishery and purchase my supply of shad and bring them down and salt them away. The price varied according to the abundance of the shad, some seasons being less expensive than others. As I recollect it the Pettibones used to have charge of the fishery above Wilkes-Barre."

Dr. Charles F. Ingham says:

"I remember the old shad fisheries in the North Branch, particularly the Butler fishery, which was on the bar opposite and a little above Union street, Wilkes-Barre. Nanticoke dam was commenced in 1828 and finished in 1830, and I recollect that that ended our fishing, although I saw shad caught below the dam by hooks attached to poles—think it

was the year the Shamokin dam went out—yet I have never heard tell of or seen shad being caught since that time above the dam. The shad, as I remember them, were very fine and particularly large. I have seen the beach, after the drawing of the seine, for a hundred feet absolutely alive with flopping shad, each one reflecting the sunlight like a burnished mirror. I recollect having the salted and smoked shad during the fall and winter, and fine delicacies they were.

“After our shad fishing was cut off, a great number of salt shad were brought from Philadelphia and other points, meeting with ready sale, on account of general knowledge of their delicacy. I believe that at one time the people knew more of salt shad than they now know of salt mackerel, and more of smoked shad than now of smoked salmon.

“I believe that a proper shad-way could now be put in the Nanticoke dam sluice-way or chute at an expense not to exceed \$10,000, and probably for less, without interfering with navigation.”

Mr. Isaac S. Osterhout says:

“In 1820 or 1821, we caught shad in very large quantities at Black Walnut Bottom. I remember well I went with Captain —— to Salina, New York State, after salt, as we had run out of that article very early in the season; he had a load of whetstones and I a load of shad. I could have easily gotten rid of my shad on the first day, had it not been that the Captain and I had agreed that the whetstones should sell the shad, and *vice versa*. So it was several days before we got our loads of salt, as the whetstones went terribly slow. In 1822 and 1823 I was at Hunt's Ferry, when the shad were plenty. I came to Wilkes-Barre in 1830, the early part of the year, the same year the Nanticoke dam was finished; do not recollect of any shad being caught after that. I recollect of a Mr. Walter Greens, who came from New England and settled at Black Walnut Bottom giving twenty barrels of shad for a good Durham cow.”

Jameson Harvey says:

“I was born in 1796; I remember the old fishing in the North Branch of the Susquehanna river very well: James Stewart had a fishery opposite my place. The big haul was made at Fish Island fishery. I recollect it very well; they didn't know how many they caught. After all were disposed of that could be, the rest were thrown on the fields and pretty near stunk us to death. They were landed on the point of the island. There were two seines on fish island: one owned by Nanticoke parties, the other by Buttonwood parties, who took turnabout fishing. The Mud fishery was at Steele's Ferry; they drew out on Shawnee side. The Dutch fishery was below the dam on Croup's place. Below Hunlock's creek was another: that was called a mud fishery. There was a fishery at Slickshinny. When the big haul was made the shad sold for a cent apiece; they sold as many as they could: there wasn't salt enough. In those days they didn't salt down so much pork; they de-

pended upon the shad they caught; they gave the poor a chance after they got all they wanted.

"People on the West Branch used to own an interest in the Hunlock fishery, and a Mr. McPherson used to come in a boat to get their fish and take them back. They used to come from Easton bringing salt, with which they used to buy fish; you could get one hundred shad for a bushel of salt. Nanticoke dam was commenced in 1828 and finished in 1830. I only recollect of one shad being caught above the dam since it was put in, and that was on the flats after a big freshet. The people used to go off the bars with as many shad as they could carry; they came in from all around in crowds; they used to camp and salt their fish down on the banks of the river. Mr. McPherson used to take his boats back to the West Branch loaded. He traded off cider, oil and whisky. At the time the dam was put in, shad were selling for ten cents and twelve cents each. Widow Stewart used often to take in thirty or forty dollars of a night for her share of the haul.

"Hunlock's, Dutch and Mud fisheries were night fisheries; Stewart's and Fish Island were day and night fisheries. Farmers hauling grain to Easton, often hauled back hundreds of bushels of salt. Boats coming up the river used to bring leather, cider, oil, salt and iron; going back they would take shad. McPherson and Hunlock owned the Hunlock fishery and had a large fish-house. Hunlock got as his share from five to six hundred dollars per year, besides all the shad he could use. We used to have shad until shad came again.

"The owners of fish-houses used to have arrangements so that when they run out of salt they could dry and smoke the shad, as they now do herring and salmon. Some of the shad used to weigh eight or nine pounds; I saw one weighed on a wagger turning the scales at thirteen pounds; about seventy or eighty would fill a barrel. The shad improved very much coming up the river; those caught in this valley being very much larger and finer than those caught at Columbia. I remember when Shamokin dam went out, the shad came up to our dam and were caught."

The following extracts are from the *Susquehanna Democrat* (April 17, 1818):

"Newark, N. J., April 7.—On Wednesday three shad were caught in the river Passaic. A pair of them weighed eleven pounds and were sold to one of our public innholders at a shilling a pound. A solitary one was caught about two weeks before and sold to the same innkeeper."

May 14, 1819.—"Shad this season taken in unusual numbers; they have been sold in Philadelphia as low as \$4.50 per hundred, and at the Potomac fisheries as low as \$3.00."

April 21, 1820.—"At Alexandria shad is selling for \$2.50 a hundred, and at Philadelphia they are selling for \$3.00. In Wilkes-Barre, notwithstanding the scarcity of money, they are held at \$18.75."

April 26, 1822.—"We congratulate our friends on the prospect of

soon obtaining a supply of fresh shad: about sixty were caught here on Wednesday (24th), and yesterday (25th) upwards of three hundred. We learn that at Berwick they are caught in abundance."

The following is extracted from Miner's History of Wyoming:

"The month of February, 1773, had so nearly exhausted the provisions of the Wilkes-Barre settlement that five persons were selected to go to the Delaware near Stroudsburg for supplies. * * * The distance was fifty miles through the wilderness, etc. * * * The men took each an hundred pounds of flour, and welcome was their return to their half-famished friends at Wilkes-Barre. Never was an opening spring or the coming of the shad looked for with more anxiety or hailed with more cordial delight. The fishing season, of course, dissipated all fears, and the dim eye was soon exchanged for the glance of joy and the sparkle of pleasure, and the dry, sunken cheek of want assumed the plump appearance of health and plenty."

Hon. B. L. Hewit, of Hollidaysburg, formerly a state fish commissioner, in response to inquiries concerning the early history of shad fishing on the Juniata, says that his grandfather and others formerly caught shad above the Huntingdon dam. A fellow-townsmen, who died at the age of ninety, told Mr. Hewit that several shad were caught in McCahan's mud race, a mile above Hollidaysburg. Long prior to the erection of the public works east of the Alleghenies known as the canal, which necessitated dams, the shad came up the river as high as they could go for spawning purposes, followed by the striped bass, not large ones, which fed on the spawn. There were a few fisheries west of Lewistown; pike-perch, locally known as "Susquehanna salmon," were abundant and fine, but after the erection of the dams these disappeared, and but few shad were able to go west of Newport, Perry county, some of the more vigorous passing through the sluiceway at the Columbia dam. The early settlers living on the banks of Spruce creek above Huntingdon speared so many pike-perch that after using all they wished they took what were left (salted) down to Harrisburg and Columbia on arks in the spring freshets and exchanged the fish for coffee, sugar, etc. To a limited extent they salted shad, but they were not so abundant then as pike-perch. The fisheries extended from Lewistown down to Havre de Grace, increasing in number towards the Chesapeake.

The manifest decrease in the supply of fish furnished by the Susquehanna river aroused public attention, and in 1866 a convention met at Harrisburg to consider the existing condition of things, and an act was prepared requiring fishways to be constructed in all the dams of the Susquehanna and its tributaries. This was promptly passed by the legislature then in session and was signed by the Governor on March 30, 1866. After reciting in its preamble that by the construction of a dam across the Susquehanna shad, salmon and other fish were prevented from passing up the said stream to the great detriment and injury of

persons and communities along said river, the act provided that the several companies owning or interested in dams on the Susquehanna, or on the North or West branches of the same, between tidewater and Wilkes-Barre on the West Branch, should, within six months from the passage of the act, erect such undergates, sluices, chutes or other devices in all dams as would permit the free passage of shad, salmon and other fish up said streams.

The second section provided that if the owners of said dams neglected or refused to construct sluices as would allow the free passage of fish up said river within six months after the passage of the act, they should be liable to a fine of two hundred dollars, to be recovered as debts of like amount are recoverable by law.

Notwithstanding the alleged unconstitutionality of this act by reason of interfering with vested rights, the canal company, in return for some desirable legislation by which they were authorized to raise their feeder dam not exceeding three feet, consented to comply with its provisions, and accordingly constructed a fishway from a plan chiefly devised by the superintendent of that company, with some modifications suggested by the fish commissioner of the state appointed under the act of 1866. This fishway was placed about one-fourth of a mile from the York county shore. At this place a section forty feet long was taken from the dam, on which a new sub-dam was erected, so that its highest elevation would about equal the level of the water below the dam. The lower slope of the sub-dam was placed at an inclination of one in fifteen, and the sides of the aperture in the main dam were dentated or framed in a series of offsets so as to promote the formation of eddies in the current passing over the sub-dam. Shad and other fish in their endeavors to pass the dam were expected to be under the influence of gravity in opposite directions, the lower water seeking to obtain its level, the top of the sub-dam, the other water rushing through the aperture would meet and drive it back with a force considerably impeded by the cushion, so to speak, of lower water. The fish were expected to find this opening through which they would endeavor to pass up. If they failed in the first few trials they would naturally seek the eddies in the recesses at the sides of the sluices where they would gather strength for a new trial.

The weak point in this structure was that the fish met the greatest resistance at the top where they were expected to enter the dam and when they were in their most exhausted condition. The fishway failing to answer its purpose it was abandoned and a new one constructed a few years later at a different point in the dam.

The act of 1866, so far as the canal company was concerned, was of the nature of a contract: certain privileges were granted in return for certain duties, and until both parties acted the contract was incomplete. It was required that "a suitable way for the free passage of fish" should be constructed, and as the contrivance described was inefficient for that

purpose, it is very plain that the company did not fulfil their part of the contract.

Notwithstanding these failures, in an act creating a board of commissioners of fisheries, provided for the construction of four additional fishways, but the commissioners deemed it advisable to construct only one as an experiment. This was located in the dam at Columbia (this being the first obstruction to the fish in coming up the stream) in a place most frequented by the shad in their attempts to pass the obstruction.

A number of plans were submitted, many of them patented, but after careful consideration the commissioners concluded that a fishway for shad ought to conform as nearly as possible to the natural falls of those portions of the river which they were habitually ascending in their yearly journeys up the stream, and to avoid the difficulty presented to the fish in finding the fishway if built to extend below the dam, they also determined that it ought to be cut in the dam and extend into the pool above.

When stopped by an obstruction like a dam shad run along the obstruction seeking for an opening through which to continue their ascent. If this is not there, but a hundred feet below the dam, probably very few shad would find it, the commissioners therefore decided to erect a single trough 120 feet long by 60 feet wide; to cut this through into the dam and run it back into the pool above the dam about 100 feet; to protect the sides of the fishway with strong abutments built up on both sides, and to run the water into the fishway by having the upper end of it sunk two feet below the crest of the dam. This arrangement would give a flow of two feet of water through the fishway when the pool above the dam is full but no water flowing over the dam itself. The inclination of the fishway was but $3\frac{1}{2}$ feet in 120, so that in making the ascent shad would have to rise but one foot in thirty-five.

This fishway was a theme of discussion for a year or two after it was built, and the main point to be discovered was its utility and adaptability for the purpose intended, which could only be shown by the actual passage of fish through the channel.

While the fish commissioners frankly admitted that the work was experimental they had no hesitation in expressing their firm belief, derived from responsible citizens, as well as by careful experiment, that during the season shad had actually found their way to the waters above the dam through the fishway.

On the other hand practical fishermen and a number of reputable citizens declared their conviction that the shad alleged to have been taken from the river at various points above Columbia passed the obstruction at that place through an opening in the breast of the dam caused by ice carried down by the spring freshets.

In the spring of 1875 fully one-third of the Columbia dam was prostrated by the flood and floating ice, and during the following season shad

were caught in seines for the first time that year since the construction of the dam, forty years previous. Breaks occurring in the dam in the two following years, the appearance of shad in the upper river was very noticeable.

From all of the evidence gleaned from various sources it is very evident that from 1870 to 1875 shad annually appeared in greater or less numbers in the stretches above the obstruction at Columbia, but as to how they made the passage of the dam there exists a difference of opinion.

The question of removing the dam at Columbia was carefully considered and reported on to the legislature by a joint special committee in 1877. At that time it seemed manifest to the committee that there was very little if any hope for the improvement of the fisheries through the medium of fishways. It occurred to them, however, that the dam might be completely removed without proving detrimental to the adjoining canal. It was claimed this could be done by extending the canal one and three-fourths miles up the York county shore to Chiques falls; that by the construction of a small wing dam, and possibly without it, a sufficient force and head of water could at all times be secured to feed the canal. Scientific and practical men looked upon the scheme as feasible, and so deeply was the committee impressed with the value of the arguments advanced in its support that they at once secured the services of a civil engineer of much experience, who was directed to proceed to make the necessary surveys and measurements of the ground for the proposed extension of the canal as well as the depth of water in the river at the point indicated for a new feeder. The report of the engineer, with an accompanying plot of the survey, recommended the construction of a dam at Chiques falls. This report was submitted by the committee of the legislature, without approval. Able professional men claimed that the necessity for a dam at Chiques falls would be obviated by increasing the depth of the canal, which, with other matters advanced by practical men so strongly impressed the committee that, notwithstanding the report, they still regarded the removal of the Columbia dam and feeding the adjoining canal without erecting obstructions in the river as entirely feasible and practicable, meriting careful consideration by the legislature.

On the 14th day of May, 1874, the legislature appropriated \$22,000 to be expended by the Board of State Fish Commissioners in having constructed during the year 1874, by contract with the lowest and best bidder, after due and public notice, fishways or ladders for the passage of anadromous or migratory fishes, as follows: The three fishways that they were required to construct during the year 1873, but which they did not construct, were as follows: One in Clark's Ferry dam; one in the Shamokin dam, and one in the first dam in the Juniata river above its confluence with the Susquehanna river.

It was provided, however, that none of the fishways named in section three of the act should be put under contract or constructed unless the said commissioners, or a majority of them, should, on or before the first day of June, in the year 1874, file a certificate with the Auditor General that in their opinion the fishways already constructed in the Columbia dam were successful and could be successfully used for the passage of migratory fishes.

On June 11, 1879, the legislature made an appropriation of \$30,000 to carry into effect the provisions of that act which gave the commissioners authority to use fifteen thousand dollars thereof in the construction and remodeling of the fishways in the Columbia dam.

The commissioners found on trial that there were difficulties in the way which they could not conquer without a greater command of means than the law allowed them, and they were thus prevented from carrying their experiments farther.

The act of assembly approved July 2, 1885, appropriated \$25,000 for four specific purposes, of which \$9,000 was to be expended by the State Fish Commissioners in the establishment of a fishway below the Shamokin dam in the Susquehanna river. This was one of the perplexing problems which the new board was called upon to solve. Many patentees made application for a trial of their fishways, each inventor claiming decided superiority over all others. All of the models submitted, received a most careful examination, and the conclusion reached was, that all which gave promise of efficiency, were of such a costly character as to preclude any idea of their adoption. At length the attention of the board was drawn to a Nova Scotia invention, the "Rogers' fishway," which combined simplicity, durability and efficiency with comparative inexpensiveness. A personal inspection of a number of these fishways in Nova Scotia waters, where more than forty of them have been in successful use for a number of years past, demonstrated beyond a doubt that they possessed all the merit that was claimed for them. They had been introduced there, by and with the consent of the Dominion government, and had been found so effective, there is reason to believe that within a few years all the streams of that province in which the passage of anadromous fishes to their natural spawning grounds has been obstructed will be supplied with them. The gaspereaux and salmon of the Nova Scotia rivers ascend those fishways freely, and it was the decided opinion of the patentee that shad would ascend them as readily as the salmon or the gaspereaux. So strong was his faith on that point, that he agreed to erect one of his fishways in the dam that spans the Susquehanna river at Columbia, at his own expense, and waiving all claims for pay until it was satisfactorily demonstrated that the fishway would successfully resist the destructive action of the ice freshets, and that shad in reasonable numbers would ascend it. As the board was deeply impressed with the importance of having two fishways erected

in the dam at Columbia, and had every reason to believe that it would prove a success, a second one was ordered to be built at that point at the state's expense, without any guarantee from the patentee.

It was at first proposed to build these fishways in the large opening or fishway located nearly in the center of the dam, but after careful examinations made on two different occasions, by two members of the board and the engineer; it was finally decided to build the "Roger's patent" in the old fishway formerly built by the owners of the dam, and located much nearer the York county shore; and in September, 1886, the fishways were built in this opening. Ten men, besides the engineer and foreman, were employed in the work, and 24,500 feet of hemlock timber and plank, 13,400 feet of oak, 5,700 pounds of iron bolts and 300 perches of stone ballast were used in the construction.

These fishways successfully resisted the heavy ice freshets of the following winter; and in the spring when the shad commenced their movement up the river, a test of the ability of the fishway to pass them through, was made by staking a gilling net for a couple of days and nights in a semicircle around the upper end of the fishway, leaving a considerable body of water between the net and the structure. A number of shad made the ascent and were caught in the meshes of the seine, leaving no doubt in the minds of the commissioners as to the success of the fishway which was accepted and paid for by the state.

The Board of Fish Commissioners appointed by Governor Hartranft in 1873, consisting of B. L. Hewit, H. J. Reeder and James Duffy, at once recognized the fact that illegal, indiscriminate and wasteful fishing had almost depopulated the great streams of the state emptying into the Atlantic, which, at one time, abounded with shad. They made a very careful study of the situation as it then existed, and came to the conclusion that the deterioration was due principally to the following causes: (1) The practice of fishing with drift nets in the lower portion of the rivers. (2) The "close time" or the time during which fishing is forbidden in the rivers not being sufficiently long and not being observed. (3) The destruction of the young, when returning to the sea, by fish-baskets.

The annual supply depends of course upon the ability of the shad to reach proper places for the deposit and hatching of their eggs. In their progress up the river they met net after net thrown across the channel for their capture. All the contrivances which man, their most destructive and unrelenting enemy, could devise were placed to entrap them, and as a natural result very few of those which originally started from the sea reached their spawning grounds. The "close time" commenced at midnight on Saturday of each and every week during the fishing season and continued until midnight Sunday. Without "close time," which is intended to allow a certain interval during which the river shall be free of nets, and an open highway offering no impediment to the upward

movement of the shad, it would be marvelous indeed if any succeeded in gaining the upper stretches of the river.

The deadly fish-basket has played its part in the wanton destruction of fishes of nearly every kind and is worthy of the most severe condemnation. Its long arms or wings of stone reaching from the basket in or near the middle of the stream, in an upward direction on either side towards the shores, gather in every living creature carried by the current. A slight blow that will displace a scale will cause the death of these delicate little fish, and scarcely a young shad which succeeds in passing through the slats of the basket will live, while millions are caught upon the basket and there left to die. As many as a cartload of young shad have been known to accumulate in a single basket in less than one night and were shoveled out to fertilize the land on which they were left to rot. When these facts are considered in connection with the natural enemies of these young fish which they always have to contend with, it is not at all surprising that our streams became depopulated.

The Board of Commissioners commenced in an energetic way the work of the restoration of the fisheries. The first step taken was in the direction of removing the fish-baskets, but some difficulty was met with on account of the peculiar construction of the law requiring ten days' notice to be given by the sheriff before proceeding with a *posse comitatus* to destroy the basket. The commissioners earnestly recommended that that portion of the law requiring ten days' notice be stricken out, and that the passage of the law should be in itself sufficient notice. And that in addition to the required destruction of the baskets, an act imposing a penalty for the erection or maintenance of fish-baskets be passed. With this law upon the statute books and the means then at their command the board believed that in another year they would be able to announce the entire removal of the destructive fish-baskets.

With the drift-net it was very different. This interest being too large and too valuable to be swept away by an enactment. A proper "close time" and a strict observance of it would to a great extent assist in repairing the losses caused by these nets. Besides the ground is often inaccessible to a shore fishery, and consequently the only means of fishing it is with a drift or gilling net.

It was plainly seen that the chief reliance in reviving the shad fisheries must be by artificial propagation, and soon after their appointment the commissioners placed themselves in communication with Seth Green, the famous fish culturist, then residing at Rochester, New York, and purchased from him the right to use his patent hatching-boxes for shad, for three years, in the State of Pennsylvania, for the sum of \$2,000.

Marvelous results it was claimed had been obtained in the rivers of other states by the use of this appliance. In the Connecticut river, where the fisheries were rapidly being abandoned on account of the

scarcity of fish, the third year after these boxes were first used in the hatching of shad it is said the catch exceeded that of any year in its history. The young shad return mature fish to the rivers when three to four years old. Fisheries which had been in existence for nearly a century, and at which records of their annual catch were kept, reported their yield of 1870 as being larger than ever before. Referring to this result, the Fish Commissioners of Connecticut, in their report for 1873, said:

"The number of shad running in the Connecticut river has increased to such an extent that the complaint of the fishermen is no longer a paucity of fish, but that the market is so overstocked that they do not obtain a remunerative price for them."

The same desirable result was claimed by the use of these hatching-boxes in the Hudson river, but not to so marked a degree owing to a scarcity of good spawning grounds upon which to take the shad. Carefully considering what had been accomplished by artificial propagation, and believing that fully as much could be done for the shad streams of Pennsylvania, the commissioners felt justified in paying Mr. Green the amount of money named for the use of his invention.

Very soon after the purchase of the right to use the hatching-boxes Mr. Green came to Pennsylvania, bringing with him an assistant, Mr. Edward H. Boehme, and a station was at once established at the fishery owned by Miller & Kough, located at Newport, in Perry county. At the time of the establishment of this station as a base of operations the water temperature was about 62° Fahrenheit; within a short time afterwards it ran up as high as 75°, and at one time reached 82°. This sudden and extreme change very noticeably affected the gravid fish, very many being taken with the eggs dead in them. Owing to these unfortunate causes the operations at this station were not as successful as they otherwise would have been, but about 2,700,000 young shad were hatched.

About this time another of Seth Green's assistants was sent by Prof. Spencer F. Baird, the United States Commissioner of Fisheries, to the Susquehanna to assist in the work of hatching shad, the State of Pennsylvania paying all the expenses of hatching other than that of his own personal compensation. Owing to the suddenness with which the warm season set in he was able to hatch only about 500,000, and the total number of young shad produced by the artificial method and for the first time liberated in the Susquehanna river, was something in excess of 3,000,000.

Dr. J. H. Slack, one of the Fish Commissioners of New Jersey, was authorized by the United States Fish Commissioner to establish a hatching station on the Delaware river at Point Pleasant, Bucks county, and was placed in charge of the same. At this station not quite 500,000 of shad-fry were hatched and turned into the Delaware in the latter part of the month of June, 1873.

The legislature on the 14th day of May, 1874, passed an act which was approved by the Governor authorizing the fish commissioners to expend a sum not exceeding \$3,000 for the artificial propagation of shad in the Delaware river during the season of 1874, provided a certificate of the action of the State of New Jersey, appropriating a like sum of money for the same purpose, should be filed in the office of the State Treasurer, authenticated as required by the laws of said state; but owing to the failure of the Legislature of New Jersey to make the appropriation the money provided by Pennsylvania for the Delaware could not be used.

THE DELAWARE.

Very little information, it appears, can be found on record as to the old-time fisheries and their location on the upper Delaware. As early as October 26, 1680, Mahlon Stacy, in a letter written at "Falls of the Delaware," says:

"Fish in their season are very plenteous. My cousin Revell and I, with some of my men, went last third month (March) into the river to catch herrings, for at that time they came in great shoals into the shallows. We had neither rod nor net, but after the Indian fashion made a round pinfold about two yards over and a foot high, but left a gap to keep the fish in, and when that was done we took two long birches and tied their tops together and went about a stone's throw above our said pinfold, then hauling these birch boughs down the stream where we drove thousands before us, but got as many into our trap as it would hold, and then we began to haul them on shore as fast as three or four of us could by two and three at a time, and after this manner in half an hour we could have filled a three bushel sack of as good and large herrings as ever I saw; and though I speak of herrings only lest any should think we have little other sorts, we have great plenty of most sorts of fish that ever I saw in England, besides several others that are not known there, as rocks, catfish, shads, sheepsheads, sturgeon."

In response to inquiries made of Mr. L. W. Brodhead, of Delaware Water Gap, that gentleman writes as follows:

"I am in receipt of your favor, and take pleasure in giving what information I have in my possession in regard to early fishing for shad in the upper waters of the Delaware. This consists of a lease for a shad fishery, dated 1787, from Benjamin Van Campen to James Brooks, William Coolbaugh, Cornelius Brooks, John Van Campen, Cornelius Depue and Daniel Labar, Jr. The fishery 'is the shore of a tract of land formerly Ryersons (Ryerson's), in the township of Walpack, Sussex county, N. J., joining land of Robert Hoops and others, in tenure and occupancy of William Coolbaugh. The place for drawing the net is downwards from the mouth of Duncan's creek,' etc. Consideration—twelve shad per annum. Duration of lease—ninety-nine years.

"The three signers just named resided in Walpack township, Sussex (now Warren) county, N. J., and the others in Smithfield, Pennsylvania. Benjamin Van Campen also resided in Smithfield, at what is now known as Shawnee. The place of the fishery is now known as Shoemaker's ferry, five miles above Delaware Water Gap. The Van Campen's were among the early settlers of the Minisink valley—valley of the Delaware north of the water gap—as were also the Depue's, Coolbaugh's and Labar's."

"A few days ago I received from an old friend residing at Deposit, N. Y., an interesting letter in answer to my inquiries concerning fisheries in the upper Delaware, and he speaks of the primitive method as follows:"

"In my youth immense numbers of shad came up the Delaware every spring to and above this place on the west or main branch of the Delaware, and shad fishing was a regular business among the early settlers, furnishing an abundant supply of food. About the first of June some ten or a dozen neighbors would assemble, and selecting a suitable place would construct a large wier or pen near the shore, with an opening for the fish to enter. From this a brush wing or dam was extended diagonally up and across the river to the opposite shore. They then went up the river some two miles or more and constructed what they termed a 'brush seine,' composed of limbs of trees with the leaves adhering and reaching from shore to shore. The branches were bound together with withes. The men were then placed at regular distances in the water, pushing the brush seine and driving the shad before them into the pen below. In this way many hundreds and sometimes thousands were secured. The same process would be repeated below, forcing the shad up the river to an opening made in the opposite side of the pen. * * * The shad continued to come to the headwaters of the Delaware till the dam was constructed at the mouth of the Lackamaxon.

"Of some of the early settlers and those participating in fishing for shad were the following-named persons: John Silvester and Samuel Hulce, Benjamin and John Whitaker, Peter Pine, Elisha Burrows, Stephen and James Stiles, Benjamin Carman, John Peters, Gilbert Dickinson, Benjamin and William Hawley, Gideon West, Silas Crandale, William Wheeler, William and Samuel Butler, and Henry Gregory, all deceased.

"I am now eighty-eight years of age; was born and brought up at the 'Cook House,' now Deposit, where I have resided ever since. Have been largely engaged in the lumber business, sending it down the beautiful Delaware. My grandfather, John Hulce, and my father, Silvester Hulce, were the first settlers of this place. They came from Orange county, N. Y., in 1789."

With the hope that some of the older people residing on the banks

of the Delaware might be able and willing to furnish interesting data in regard to the early shad fisheries in that river, a request for information was printed in the *Milford Dispatch* of November 5, 1891, and the only response received was the following communication:

"In last week's *Dispatch* is a request for information as to the early history of shad fishing in the upper Delaware. Your correspondent can recollect assisting at the Yankee fishery as early as 1826, and other near-by fisheries down to 1868. During these years, we heard probably all about the early history of shad fishing on the upper Delaware, and from recollection we would infer that the Point fishery was the first. This was a 'day fishery,' that is, the fishing was done in the daytime and thousands were taken at a haul. The fishermen's net (with ropes) reached across the river where they started, a half mile below where the Millford bridge now stands. The men on each shore walked down and a canoe that would hold five men, four to pole and one to hold the rope, was at each end, with smaller canoes to watch for hitches, and when opposite the point of the Minisink island the canoes left the shore and met on the point of the island. A haul over this fishery swept over what has been called the 'Yankee, Crooked Billet, Cabin, Streak and Barn' fisheries and covered about one and a half miles. It was established after 1751. Then Pennsylvania purchased from the Indians, from the Delaware to the Susquehanna, but not to the head of the Delaware.

"When it ceased to be used as a fishery I am not certain. I find a deed among my father's old papers dated 1819, conveying one share, or one-fifteenth interest, in the Point fishery. This deed recites three transfers, beginning with Roger Clark. I also found two old deeds for shares in the Yankee fishery dated 1825. This was part of the ground used by the Point fishery. Above this the shad fisheries amounted to but little. One at Holbert's Eddy, half a mile above Milford; one at Lackawaxen and one at Mast Hope. Between Milford and Dingman's were two, one at Conashaugh and one a mile above Dingman's on the Jersey side called the Field fishery.

"Except at the Point, fishing has always been done at night when the shad come on their beds to lay their eggs. The Point and Yankee were company fisheries, the others were private and run by the owners of the shores.

"WM. C. CRAWFORD.

"MATAMORAS, *November 9, 1891.*"

At the present day, important fisheries are located on the Pennsylvania side of the Delaware at the following points: Lambertville, Scudder's Falls, Titusville, Washington's Crossing, Trenton, two near Bristol, one at Bristol, Torresdale, Tacony, Bridesburg, Tinicum, Chester and Marcus Hook; and it is said that 872,000 shad were caught on this side of the river during the season of 1891.

By the introduction of fishways, the Lackawaxen, one of the larger

tributaries, in 1891, for the first time in many years, had thousands of shad restored to its waters, many being taken twenty-five and thirty miles above the dam.

The Lehigh river was, years ago, a fine shad stream. Tidewater extends only a short distance above the river in the Neshaminy and the Brandywine, and the shad frequent these creeks for the purpose of spawning.

The Schuylkill river at one time was the favorite resort of the shad. William Penn, in one of his letters mentioned that "six hundred shad had been taken with one sweep of the seine," and in fact this river maintained its reputation until the erection of the Fairmount dam rendered it almost barren of shad between the dam and its confluence with the Delaware, a distance of eight miles. This result has been attributed to the pollution of its waters by the refuse from the city gas works, but it occurred within three or four years after the erection of the dam in 1820-21, whereas the gas works were not constructed till about 1830.

Of the numerous streams flowing from the New Jersey side, and which are all spawning grounds for the shad, may be mentioned Cooper's creek and Rancocas creek, above Gloucester city, and below that point are Big Timber creek, Salem creek, Raccoon creek, Old Man's creek and Woodbury creek.

In Big Timber and the Rancocas the shad run up a distance of fifteen or twenty miles. The former is one of the best shad fishing streams on the Jersey shore and has been successfully fished for many years, some of the fisheries being located eight and ten miles above its mouth, and it is a singular fact that shad have been caught at these fisheries a week or ten days earlier than the nets in the Delaware have taken any.

Big Timber creek is about thirty miles in length, rising in the watershed between the Delaware and the Atlantic, and has many sinuosities, with deep holes from thirty to forty feet of water. Young shad have frequently been seen jumping in the waters of this creek in the months of September and October, while they have been observed in the Delaware at Easton as late as November 12, in the year 1869, and one of the New Jersey fish commissioners, it is said, saw young shad two and a half inches long at Howell's fishery on the eighth day of June the same year.

The shad and herring seek our fresh water streams in early spring, moving in schools, sometimes of immense numbers. The shad usually spawn in the clear running waters above tide. The herring do not go above tide, which reaches Trenton, on the Delaware, but are believed to spawn upon the grassy flats below. The successive runs of shad continue from about the middle of March to the last of June or early part of July, they having been sold on July 4, 1870, in Bucks county. They are few in number as a rule until the middle of April, from this time to the middle of May comes what is known among fishermen as the great

run, after that their number rapidly diminishes. In taking these fishes two kinds of seines are used, the sweeping seines and the gilling nets. As the fish swim in deep water or channels, both of these kinds of seines are therein cast. The shore seines sweep the channel opposite a given length of shore, and are drawn to the shore by strong lines varying in length according to the length of seine and the distance over which it is to be drawn.

The space over and through which these seines sweep is, in legal parlance, a pool or fishway. In the compact of 1783, between Pennsylvania and New Jersey, they are the fisheries alluded to as being annexed to the shores, and to be guarded and regulated by suitable legislation. They have, from a very early period in our colonial history, been recognized as vested rights, and as such subject to be conveyed with, or apart from, the adjacent lands. They are also taxed as real estate.

The great bulk of shad caught in the tidal portion of the river and the bay are taken to Philadelphia. As a matter of fact, Pennsylvania is more deeply interested in the shad fisheries than is New Jersey. Besides being the recipient of most of the shad taken, a great number of her citizens are engaged in drift-net fishing, and with one or two exceptions all the shore fisheries below Trenton, both on her shores as well as those annexed to the New Jersey shore, are fished by Pennsylvanians.

Mutually interested, the legislation for the protection of the fisheries has, by long-established usage, been concurrent or coincident on the part of the two states, and the State of Delaware within the last few years has been in accord.

As a matter of course, the catch of shad in the Delaware river varies very considerably from year to year, and it may be considered unfortunate that full and accurate statistics for a series of years are wanting, save in the case of one fishery belonging to the Howell family, of Woodbury, New Jersey. This fishery it is said has been in the possession of one family since prior to 1700 and a careful record of each haul of the seine has been kept. From this record it would appear that until the introduction of the gill-net (1820-25) the catch averaged about 130,000 per annum.

In speaking of the product of this fishery, the late Dr. Slack, in a report made in 1873, says:

"Not to enter into detailed statements, but dividing the period between 1818 and 1873 into four cycles, each of which may be taken as representative of the intervening period, we have,

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|---|---------|
| Average catch per season, 1818 to 1822, | 131,000 |
| Average catch per season, 1845 to 1849, | 66,890 |
| Average catch per season, 1866 to 1869, | 60,739 |
| Average catch per season, 1870 to 1873, less than | 25,000 |

"The season of 1873 did not pay expenses. But not only have these fishes decreased in numbers but also in size. In 1843 shad of seven and eight pound weight were by no means uncommon, and the average run

was between five and five and a half pounds. Now in the Delaware river a four-pound fish is a curiosity. A catch is recorded as having been made near Burlington, New Jersey, in 1843, of 317 shad averaging over six pounds each. Forty shad then filled a pork barrel, mackerel barrels not being in use. Over a hundred of the present deteriorated fishes are now required for this purpose."

A company composed of Mr. B. Wilkins and his two partners carried to market and sold the product of sixty-three nets for about thirteen years prior to 1840. From Mr. Wilkins' statements it appears that in 1870 and 1871 no single gilling-net approached in the number of its catch to the quantity formerly obtained, though the length of the nets had been greatly increased. He instances the case of one gilling-seine of 200 fathoms, used in the vicinity of Fort Delaware, as having taken while he was carrying for them 850 shad in one drift, and says that at no time for five years previous to 1870 were over 200 taken in the same time, and 100 perhaps would be a high average.

Great diminution in the quantity of fishes taken was also experienced at the shore fisheries. To such an extent did it reach that many were abandoned as unprofitable. In evidence of this it may be said that until 1820 (which was probably the most productive year for the shad fisheries ever known) there was no appreciable decrease in the numbers or size of shad. It was in that year that the great haul of 10,800 shad was made at Fancy Hill (now Gloucester), the largest haul by several thousand fishes ever made upon the river Delaware.

The Delaware river was in a more depleted condition than the lower Susquehanna. During the season of 1873 there were not on the Delaware six fisheries which proved remunerative. The largest shore fisheries upon the river by the slenderness of their yield entailed an actual loss upon their owners.

For twenty-five years preceding the first restocking (1872) the Delaware with shad none were seen further up the river than Milford, although they had been at one time plentiful at Hancock, over fifty miles above Lackawaxen. Thousands were annually taken between Lackawaxen and Hancock in bush seines and eel weirs, the rough and rocky part of the river preventing the drawing of nets. Not only the mature fish were captured, but the young fry were destroyed in immense numbers, on their way down to the ocean, by hundreds of traps. This indiscriminate slaughter of shad, from the upper stretches of the river to tide water, resulted in their disappearance above Milford, and in 1872 the fisheries at that place yielded only single fish where they had once rewarded the fishermen with enormous hauls.

In 1875, three years after the restocking experiments had been tried, there was a notable increase in the catches at Milford, and in 1876 shad again appeared as far up as Lackawaxen. The increase has been large and steady ever since and shad arrive at that point in large schools

every spring. As the canal company's dam was an obstruction which they could not overcome, until the fishways were built, the shad gathered at the foot of the dam and remained there, being protected by law against bush seines and eel weirs, and as nets cannot be successfully used above Milford, there were no means for the people up the valley to take the fish except by spearing, in which manner they were captured at Lackawaxen, where men and boys collected at night at the bulkheads and breakwaters. By throwing strong light on the water by means of jacks the fish were plainly brought to view and were speared by the hundred.

The first attempt to hatch shad on an extensive scale on the Delaware by the United States Fish Commission was in the year 1885, when the steamer "Fish Hawk" was stationed at Gloucester city, New Jersey, from May 23 to June 10, and succeeded in securing about 10,000,000 eggs. The steamer "Lookout" made two trips to the Delaware for the purpose of collecting shad eggs, most of which were transferred to Battery Station, near Havre de Grace, Maryland.

The "Fish Hawk" hatched over 8,000,000 and the fry returned to the Delaware, nearly all being liberated in tide water.

In 1886 the "Fish Hawk" was again on the Delaware, in the vicinity of Gloucester city, engaged in transporting spawn takers, and in collecting, transporting and depositing eggs. 34,454,500 eggs were obtained, from which 23,196,000 fry were hatched on board, and 21,018,000 deposited in the Delaware river. During the season of 1888 the "Fish Hawk" collected 48,607,000 shad eggs at five of the fisheries operated on the New Jersey side of the river below Gloucester city and from gilling nets near by. Of the fry hatched 14,840,000 were deposited in the river near Gloucester city, and through the Pennsylvania State Fish Commission 16,011,000 fry were liberated in the numerous pools in the upper stretches of the Delaware river. The following statement compiled, by the United States Fish Commission, shows the number of shad taken in the Delaware river during the years 1885 to 1889, inclusive:

| | |
|-----------------|-----------|
| 1885, | 1,148,496 |
| 1886, | 874,017 |
| 1887, | 800,265 |
| 1888, | 856,662 |
| 1889, | 984,941 |

The statistics of the production and deposits of shad-fry for the seasons 1889, 1890 and 1891 in the Delaware river are not yet available for publication, but in the year 1890 the upper waters of this river were fairly swarming with shad, the like of which had never before been seen in the recollection of the people of that section. At Lackawaxen dam they were seen by the thousands, and at Milford, where the river is not more than four hundred feet wide, fishermen took as many as three hundred as a night's haul, when before fifty was considered a good catch. In that section the appearance of shad in such abundance en-

couraged the farmers to club together to buy nets and engage actively in fishing.

The statements made in some newspapers during the fishing season of 1891 that the fishermen were greatly alarmed by the alleged tremendous decrease in the take of shad, were not correct. It is true that the waters of the Delaware the year previous were filled with this species, and at the height of the season as many as 100,000 were caught and brought to the Philadelphia market in one day.

The largest haul made on any one day in the season of 1891 netted about 75,000 shad. Notwithstanding the yield for 1891 was about twenty-five per cent. less than that of 1890, prices were much better, "roes" selling as high as thirty dollars per hundred, and as a rule the fishermen found the harvest had yielded greater profits than did that of the previous year. This was brought about chiefly by the phenomenal number of "counts" or large roe shad.

Impurities in the waters of the river furnished satisfactory reason for the decreased number of shad so far as a few of the fishermen were concerned. They believed the sewage from the great city of Philadelphia, and the refuse from the gas works and the oil refineries, had driven away or killed off the numerous schools of fish: but such does not seem to be the case, for authentic information received from persons living on the upper reaches of the river show that the waters were alive with shad, and they were seen disporting by hundreds for many miles above Egypt Mills, in Pike county, and well up in New York State, fully three hundred miles from the ocean, a point higher than they have been known to reach since 1823, when the canal company erected the dam across the river at Lackawaxen.

In 1890 a fishway was placed in this dam jointly by Pennsylvania and New York, and for the first time in nearly seventy years the people of that region had this luxury brought to their very doors.

In all probability many thousands of shad were successful in ascending the river to their natural spawning grounds in its upper waters, and more eggs were thus deposited naturally there in 1891 than for many years previously.

Artificial propagation must be largely depended upon for profitable results in the restoration of the fisheries, whether of our rivers or lakes. It is true that many disappointments have been experienced in the work begun in this direction, and the hopes of a recovery from depletion and an increase in the supply have in many cases been blasted. Failures no doubt have resulted in a large degree from the limited scale on which the work was formerly conducted—where a hundred thousand young fish were introduced a million should have been liberated—but the United States Fish Commission and the State Commissions in their earlier days were unable to procure large quantities of eggs, and it was only by gradual processes that the spawning fish were multiplied sufficiently to answer the purpose.

But too much must not be expected from artificial propagation, as it has to contend not only with the depletion by excessive fishing, but also with changes of physical condition, such as temperatures, etc.

The Delaware river at present, everything being considered, is probably the best shad stream in the country, this condition being brought about by liberal re-stocking, the passage and enforcement of wise laws to protect the food-fishes in the spawning seasons, and the removal of the so-called fish baskets, which destroy the young by myriads.

The efforts of the commissioners will at once be directed to the work of restoring the Susquehanna, once the most prolific shad river in the state, to its old-time glory. This can be accomplished by pursuing the same policy as that inaugurated on the Delaware, and by placing practical fishways at the several dams that obstruct the fish on their way up the stream.





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